CLAIMS

What is claimed is:

1. An integrated convective accelerometer chip, comprising:

a convective acceleration sensor including a heater element and a plurality of temperature sensing elements, the plurality of temperature sensing elements being operative to generate a differential output voltage indicative of a magnitude of acceleration applied along at least one axis passing through the heater element and the plurality of temperature sensing elements;

amplification circuitry configured to receive the differential output voltage generated by the plurality of temperature sensing elements and operative to generate a corresponding common-mode output voltage; and

control circuitry configured to receive the common-mode output voltage generated by the amplification circuitry and operative to generate a control output proportional thereto, the control circuitry being further operative to regulate the common-mode output voltage using the control output.

2. The chip of claim 1 wherein the control circuitry is operative to regulate the common-mode output voltage by regulating a current through the heater element.

3. The chip of claim 2 wherein the control output is a pulsed output and the control circuitry is operative to regulate the current through the heater element using pulse modulation.

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4. The chip of claim 3 wherein the control circuitry is operative to regulate the current through the heater element using pulse-density modulation.

5. The chip of claim 3 wherein the control circuitry is operative to regulate the current through the heater element using pulse-width modulation.

6. The chip of claim 3 wherein the control circuitry includes a sigma-delta modulator operative to generate the pulsed output.

7. The chip of claim 3 wherein the heater element has a first terminal connected to a supply voltage and a second terminal, and wherein the convective acceleration sensor further includes a pass transistor having a drain connection coupled to the second terminal of the heater element, a source connection coupled to ground potential, and a gate connection controlled by the pulsed output generated by the control circuitry.

8. The chip of claim 1 further including a reference voltage generator operative to generate a reference voltage level.

9. The chip of claim 8 wherein the reference voltage level is a fixed voltage level.

10. The chip of claim 8 wherein the reference voltage level is proportional to a supply voltage level.

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11. The chip of claim 8 wherein each temperature sensing element has a respective first terminal and a respective second terminal, wherein the respective second terminals of the temperature sensing elements are connected, wherein the acceleration sensor is operative to generate the differential output voltage across the respective first terminals of the temperature sensing elements, and wherein the acceleration sensor is further operative to set the connected respective second terminals of the temperature sensing elements to a desired voltage level proportional to the reference voltage level.

12. The chip of claim 8 wherein the reference voltage generator is further operative to generate a level proportional to the absolute temperature of the chip.

13. The chip of claim 1 wherein acceleration sensor including the heater element and the plurality of temperature sensing elements are silicon micro-machined devices.

14. The chip of claim 1 wherein the common-mode output voltage is proportional to power dissipated in the heater element.

15. A method of operating a convective acceleration sensor, the acceleration sensor including a heater element and a plurality of temperature sensing elements, the method comprising the steps of:

generating a differential output voltage indicative of a magnitude of acceleration applied along at least one axis

passing through the heater element and the plurality of temperature sensing elements;

generating a common-mode output voltage corresponding to the differential output voltage;

generating a control output proportional to the common-mode output voltage; and

regulating the common-mode output voltage using the control output.

16. The method of claim 15 wherein the regulating step includes the substep of regulating a current through the heater element.

17. The method of claim 16 wherein the control output generated in the third generating step is a pulsed output, and the regulating step includes the substep of regulating the current through the heater element using pulse modulation.

18. The method of claim 17 wherein the pulse modulation used in the regulating step is pulse-density modulation.

19. The method of claim 17 wherein the pulse modulation used in the regulating step is pulse-width modulation.

20. The method of claim 15 wherein the second generating step includes the substep of setting the common-mode output voltage to a desired level.

21. The method of claim 15 further including the steps of converting the differential output voltage to a single-ended

output voltage indicative of the magnitude of acceleration applied along the at least one axis, and setting the single-ended output voltage to provide a desired level of gain.

22. The method of claim 17 wherein the regulating step includes the substep of applying the pulsed output to a gate connection of a pass transistor connected between a terminal of the heater element and ground potential.

23. The method of claim 15 further including the step of producing a level proportional to the absolute temperature of the chip.

24. The method of claim 23 further including the step of temperature compensating the chip using the level proportional to the absolute temperature.

25. The method of claim 15 wherein the common-mode output voltage is proportional to power dissipated in the heater element of the convective acceleration sensor.

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